

What is claimed is:

1. An optical Code Division Multiple Access (CDMA) transmitting apparatus for transmitting bipolar data,  
5 comprising:

an optical CDMA encoding means for encoding a light from the outside into a code and a complement code of the code to generate an encoded light into the code and an encoded light into the complement code; and

10 an optical modulation means for selecting and transmitting one of the encoded lights into the code and the complement code of the code based on the polarity ('0' or '1') of the data inputted from the outside.

15 2. The optical CDMA transmitting apparatus as recited in claim 1, wherein the optical CDMA encoding means includes:

an optical circulator for transmitting the light from an external light source to optical fiber Bragg grating (FBG) filters, and transmitting to the optical modulation means the  
20 encoded light into the code ( $C_n$ ), which is obtained by reflecting the light in the optical FBG filters; and

the optical FBG filters for transmitting to the optical circulator the code, and transmitting to the optical modulation means the encoded light into the complement code  
25 ( $\overline{C_n}$ ) of the code, which is obtained by transmitting the light inputted from the optical circulator.

3. The optical CDMA transmitting apparatus as recited in claim 1, wherein the optical CDMA encoding means includes:

an optical circulator for transmitting the light from an external light source to a first diffraction grating, and  
5 transmitting to the optical modulation means the encoded light into the complement code of the code, which is obtained by reflecting in the spatial filter;

the first diffraction grating for dividing the light inputted from the optical circulator for different paths based  
10 on the wavelength and transmitting the divided light to a spatial filter, and combining and transmitting to the optical circulator the encoded light into the complement code which is obtained by reflecting the light in the spatial filter;

the spatial filter for transmitting to the first  
15 diffraction grating the encoded light into the complement code of the code, which is obtained by reflecting the light inputted from the first diffraction grating, and transmitting to a second diffraction grating the encoded light into the code, which is obtained by transmitting the light inputted  
20 from the first diffraction grating; and

the second diffraction grating for combining the encoded light into the codes from the lights transmitted through the spatial filter, and transmitting the encode light into the code to the optical modulation means.

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4. The optical CDMA transmitting apparatus as recited in claim 1, wherein the optical CDMA encoder performs encoding

by using filters having an assignment of wavelengths for the light to be reflected or to be transmitted based on the modified pseudo-noise code.

5           5.     An optical CDMA transmitting apparatus for transmitting bipolar data, comprising:

          an optical modulation means for outputting a light from the outside through a different output terminal based on the polarity ('0' or '1') of data inputted from the outside; and

10           an optical CDMA encoding means for receiving the light outputted from a first output terminal of the optical modulation means, and encoding the light into a code; and receiving the light outputted from a second output terminal of the optical modulation means, and encoding the light into a  
15           complement code of the code.

          6.     The optical CDMA transmitting apparatus as recited in claim 5, wherein the optical CDMA encoding means includes:

          an optical circulator for receiving the light outputted  
20           from the first output terminal of the optical modulation means and inputting the light to optical FBG filters in the reverse direction, and then outputting through an output terminal the encoded light into the code (  $C_n$  ), which is obtained by reflecting the light in the optical FBG filters, encoding the  
25           light into the code; and

          the optical FBG filters for transmitting to the optical circulator the encoded light into the code, which is obtained

by reflecting the light inputted to the reverse direction from the optical circulator, and transmitting to the optical circulator the encoded light into the complement code ( $\overline{Cn}$ ) of the code, which is obtained by transmitting the light from the second output terminal of the optical modulation means.

7. The optical CDMA transmitting apparatus as recited in claim 5, wherein the optical CDMA encoder performs encoding by using a filter having an assignment of wavelengths for the light to be reflected or to be transmitted based on the modified pseudo-noise code.

8. An optical CDMA transmitting apparatus for transmitting bipolar data, comprising:

a first light source, which is turned on based on data inputted from the outside, for outputting a light;

a second light source, which is turned on in opposition to the first light source, for outputting a light; and

an optical CDMA encoding means for receiving the light outputted from the second light source, encoding the light into a code; or receiving the light outputted from the first light source, encoding the light into a complement code of the code, and then transmitting the code or the complement code.

9. The optical CDMA transmitting apparatus as recited in claim 8, wherein the optical CDMA encoding means includes:

an optical circulator for receiving the light outputted

from the second light source and inputting the light to the optical FBG filters in the reverse direction, and outputting through an output terminal the encoded light into the code ( $C_n$ ), which is obtained by reflecting the light in the FBG filters, and outputting through an output terminal the encoded light into the complement code ( $\overline{C_n}$ ), which is obtained by transmitting the light through the optical FBG filters; and

the optical FBG filters for transmitting to the optical circulator the encoded light into the code ( $C_n$ ) by reflecting the light inputted in the reverse direction from the optical circulator, and transmitting to the optical circulator the encoded light into the complement code ( $\overline{C_n}$ ) of the code by transmitting the light outputted from the first light source.

10. The optical CDMA transmitting apparatus as recited in claim 8, wherein the optical CDMA encoder performs encoding by using filters having an assignment of wavelengths for the light to be reflected or to be transmitted based on the modified pseudo-noise code.

11. An optical CDMA transmitting method used in an optical CDMA transmitting apparatus for transmitting bipolar data, comprising the steps of:

a) encoding a light into a code or a complement code of the code; and

b) transmitting the encoded light into the code or the

complement code based on the polarity ('0' or '1') of data to be transmitted by using one optical modulator.

12. The optical CDMA transmitting method as recited in  
5 claim 11, wherein the step of encoding the light into the code or the complement code is performed by using filters having an assignment of wavelengths for the lights to be reflected or to be transmitted based on a modified pseudo-noise code.

10 13. An optical CDMA transmitting method used in an optical CDMA transmitting apparatus for transmitting bipolar data, comprising the steps of:

a) outputting a light through a different output terminal  
based on the polarity ('0' or '1') of data to be transmitted;  
15 and

b) encoding the light outputted through a first output  
terminal into a code between the lights outputted in the step  
a), and encoding the light outputted through a second output  
terminal into a complement code of the code among the lights  
20 outputted in the step a), and then transmitting the encoded  
light into the code or the complement code.

14. The optical CDMA transmitting method as recited in  
claim 13, wherein the step of encoding the light into the code  
25 and the complement code is performed by using filters having an assignment of wavelengths for the light to be reflected or to be transmitted based on a modified pseudo-noise code.

15. An optical CDMA transmitting method used in an optical CDMA transmitting apparatus for transmitting bipolar data, comprising the steps of:

5 a) outputting a first light by turning on a first light source based on data to be transmitted;

b) outputting a second light by turning on a second light source in opposition to the step a) based on the data to be transmitted; and

10 c) encoding the second light into a code, and encoding the first light into a complement code of the code, and then transmitting the encoded light into the code or the complement code.

15 16. The optical CDMA transmitting method as recited in claim 15, wherein the step of encoding the light into the code or the complement code is performed by using filters having an assignment of wavelengths for the lights to be reflected or to be transmitted based on a modified pseudo-noise code.

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